NOTICE OF FINAL RULEMAKING

Rule 325

Maricopa County Air Pollution Control Regulations

PREAMBLE

1. **Rules Affected** — **Rulemaking Action**

Rules Affected	Rulemaking Action
Rule 325 – Brick and Structural Clay Products (BSCP) Manufacturing	New Rule

2. **The statutory authority for the rulemaking, including both the authorizing statute (general) and the statutes the rule is implementing (specific):**

Authorizing Statutes: Arizona Revised Statutes (A.R.S.) § 49-112 (A) and § 49-479

Implementing Statute: Arizona Revised Statutes (A.R.S.) § 49-479

3. **The effective date of the rule:**

March 9, 2005

4. **A list of all previous notices appearing in the Register addressing the final rule:**

Notice of Rulemaking Docket Opening, July 23, 2004
Arizona Administrative Register (A.A.R.),Volume 10, Issue 30.

Notice of Proposed Rulemaking, November 5, 2004
Arizona Administrative Register (A.A.R.), Volume 10, Issue 45

Notice of Proposed Rulemaking, Oral proceeding Date: December 9, 2004
Arizona Administrative Register (A.A.R.), Volume 10, Issue 45

5. **The name and address of department personnel with whom persons may communicate regarding this rulemaking:**

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6. **An explanation of the rule, including the department's reasons for initiating the rule:**

Maricopa County is promulgating a new rule, Rule 325, Brick and Clay Structural Products (BCSP) Manufacturing to regulate industries that are now regulated by Rule 311, Particulate

Matter from Process Industries. Maricopa County will incorporate Best Available Control Measures (BACM) and Most Stringent Measures (MSM) proposed in the Salt River PM_{10} State Implementation Revision by implementation of this rule.

Section by Section Explanation of Changes:

Section 101	This text lists the purpose of the rule.
Section 102	This text outlines the applicability of the rule.
Section 103	This text lists the exemptions to the rule.
Section 201	This text defines a “brick and structural clay manufacturing facility”.
Section 202	This text defines a “continuous kiln.”
Section 203	This text defines the term “existing kiln.”
Section 204	This text defines the term “kiln feed.”
Section 205	This text defines the term “periodic kiln.”
Section 206	This text defines the term “research and development kiln.”
Section 207	This text defines the term “tunnel kiln.”
Section 301	This text states the opacity limitation for all tunnel kilns subject to the rule.
Section 302	This text lists the particulate matter limitations for existing kilns.
Section 303	This text lists the two different particulate matter limitations for existing kilns with a capacity of less than 10 tons per hour throughput and of those with greater than 10 tons per hour.
Section 401	This text lists the compliance time schedule for the rule.
Section 501	This text lists the method for proving compliance with the rule.
Section 502	This text states the fact that records shall be kept for 5 years.
Section 502.1	This text states that daily records of kiln fees and hours of operation shall be kept.
Section 502.2	This text states the type of monthly records of materials delivered and product reports that shall be kept.
Section 503	This text lists where the test methods in the Code of Federal Regulations are kept at Maricopa County.
Section 503.1	This text lists EPA reference Method 9.
Section 503.2	This text lists EPA reference Method 5.

7. A reference to any study relevant to the rule that the agency reviewed and either relied on in its evaluation of or justification for the rule or did not rely on in its evaluation of or justification for the rule and where the public may obtain or review the study, all data underlying each study, any analysis of the study, and other supporting material:

1. "Economic Impact Analysis on Particulate Matter Emissions for Brick and Structural Clay Products Manufacturing" by David Lillie, Economist at Arizona Department of Environmental Quality, September 28, 2004.

2. *National Emission Standards for Hazardous Air Pollutants for Brick and Structural Clay Products Manufacturing; and National Emission Standards for Hazardous Air Pollutants for Clay Ceramics Manufacturing*; Final Rule, Federal Environmental Protection Agency,40 CFR, Part 63, May 16, 2003.

8. A showing of good cause why the rule is necessary to promote a statewide interest if the rule will diminish a previous grant of authority of a political subdivision of this state:

Not applicable.

9. The summary of the economic, small business, and consumer impact:

Arizona Department of Environmental Quality (ADEQ) has prepared an extensive economic impact analysis on this rule on September 20, 2004 which is summarized in the following text: There are 2 brick and structural clay product manufacturing facilities that have the potential to be regulated by this rule in Arizona and only one tunnel kiln in Maricopa County. The common materials used in both are clay minerals. Kilns used in these industries to dry and cure brick may be either periodic or batch kilns or continuous kilns such as tunnel kilns. The facility has been manufacturing brick in its present location since 1935. Its actual production rates of brick in 2002 and 2003 were approximately 45,400 tons and 40,500 tons, respectively. Reported PM emissions from curing and firing for those respective years were about 39,500 pounds and 35,200 pounds. These PM emissions from the tunnel kiln represent about 80 percent of total PM emissions at this facility. This rule will address tunnel kilns. Uncontrolled particulate matter emissions from these tunnel kilns range from 0.0350 lb/ton to 0.9756 lb/ton with an average of 0.492 lb/ton. Air pollution control devices for these kilns are dry lime scrubbers with fabric filter (DFLS) and dry injection fabric filter (DIFF) which can achieve 99 % control efficiency for PM. DLA (dry lime adsorption) technology is less efficient and is basically an acid gas device yet can provide some control for particulate matter in the range of 50% for an upper range. The MACT (Maximum Achievable Control Technology) was established by EPA in the rulemaking process and the MACT floor was based upon the use of DIFF, DLS and WS (wet scrubbers). DLA was not considered at that time. Because of several retrofitting concerns with DIFF, DLS and WS, EPA now believes that DLA is the only technology currently that can be used to retrofit existing sources without significant impacts on the production process.

The average cost per ton of PM removed for a medium-sized tunnel kiln using DLS/FF control technology is approximately $21,125. For installing DIFF in a medium-sized tunnel kiln, the cost per ton of removing PM is estimated at $18,300. DLS data and kiln test results show that DLS/FF and DIFF control technology can achieve a 99 percent control efficiency for PM. Although DLA is an acid gas device, it does provide some control for PM. The upper bound of control of PM is probably 50 percent, according to EPA. DLA control devices are used around the world to control emissions from brick kilns. EPA test data from four DLAs, which control emissions from six kilns, revealed outlet PM emissions ranged from 0.0732 lb/ton to 0.411 lb/ton. If the removal efficiency of a DLA was 50 percent with uncontrolled PM emissions averaging 0.492 lb/ton, the cost per ton to remove PM for a medium-sized tunnel kiln would be about $20,400. Caution should be used in evaluating the cost effectiveness for a DLA control device because the removal efficiency may be less than 50 percent.

Health benefits accrue to the general public whenever enforcement of environmental laws takes place. Adverse health effects from air pollution result in a number of economic and social consequences, including:

1. Medical Costs: These include personal out-of-pocket expenses of the affected individual (or family), plus costs paid by insurance or Medicare, for example.

2. Work loss: This includes lost personal income, plus lost productivity whether the individual is compensated for the time or not. For example, some individuals may perceive no income loss because they receive sick pay, but sick pay is a cost of business and reflects lost productivity.

3. Increased costs for chores and caregiving: These include special caregiving and services that are not reflected in medical costs. These costs may occur because some health effects reduce the affected individual's ability to undertake some or all normal chores, and she or he may require caregiving.

4. Other social and economic costs: These include restrictions on or reduced enjoyment of leisure activities, discomfort or inconvenience, pain and suffering, anxiety about the future, and concern and inconvenience to family members.

The purpose of the NESHAP is to protect public health. Control technologies for protecting public health are governed through EPA's MACT standards. These standards are based on the emission levels achieved by the best-performing similar facilities in the U.S. using a performance-based approach for reducing toxic emissions as well as PM. It also ensures that facilities operating with good pollution controls are not disadvantaged relative to their competitors with none or less effective controls. Likewise, Maricopa County's Rule 325 is designed to protect public health by reducing PM.

Improvement in air quality will generate cost-saving benefits by avoiding adverse-health effects, such as emergency room visits, hospital admissions, acute pediatric bronchitis, chronic adult bronchitis, acute respiratory symptom days, and even premature death. Potential benefits arising from a reduction PM and other pollutants emitted into the atmosphere can be inferred from data associated with the reduction of any airborne PM.

Some of the health effects of human exposure to PM can be quantified while others cannot. Quantified adverse-health effects include: mortality, bronchitis (chronic and acute), new asthma cases, hospital admissions (respiratory and cardiovascular), emergency room visits for asthma, lower and upper respiratory illness, shortness of breath, respiratory symptoms, minor restricted activity days, days of work loss, moderate or worse asthma status of asthmatics. Unquantifiable adverse-health effects include: neonatal mortality, changes in pulmonary function, chronic respiratory diseases (other than chronic bronchitis), morphological changes, altered host defense mechanisms, cancer, and non-asthma respiratory emergency room visits (U.S. EPA, "The Benefits and Costs of the Clean Air Act 1990 to 2010," Chapter 5, "Human Health Effects of Criteria Pollutants," Table 5-1, Report to Congress, November 1999).

Epidemiological evidence shows that particulates have negative health impacts in a variety of ways, including: increased mortality and morbidity; more frequent hospital admissions, emergency room and clinician visits; increased need and demand for medication; and lost time from work and school. There is also increasing evidence that ambient air pollution can precipitate acute cardiac episodes, such as angina pectoris, cardiac arrhythmia, and myocardial infraction, although the majority of PM-related deaths are attributed to cardiovascular disease (The EPA's Particulate Matter (PM) Health Effects Research Center Program, prepared by PM Centers Program staff, January 2002).

New evidence also links exposure to ambient PM concentrations to airway inflammation that in turn produces systemic effects, such as acute phase response with increased blood viscosity and coagulability, as well as increased risk of myocardial infraction in patients with coronary artery disease. Chronic effects of repeated airway inflammation may also cause airway remodeling, leading to irreversible lung disease. Individuals with asthma and chronic obstructive pulmonary disease may be at even higher risk from repeated exposure to particulates (The EPA's Particulate Matter (PM) Health Effects Research Center Program).

The Health Effects Institute confirmed the existence of a link between particulate matter and human disease and death (premature mortality). The data revealed that long-term average mortality rates, even after accounting for the effects of other health effects, were 17-26% higher in cities with higher levels of airborne PM (Health Effects of Particulate Air Pollution: What Does The Science Say**?** Hearing before the Committee on Science, House of Representatives, 107th Congress of the U.S., second session, May 8, 2002). Data further reveal that every 10-microgram increase in fine particulates per cubic meter produces a 6% increase in the risk of death by cardiopulmonary disease, and an 8% increase for lung cancer. Even very low concentrations of PM can increase the risk of early death, particularly in elderly populations with preexisting cardiopulmonary disease (STAPPA and ALAPCO, Controlling Particulate Matter Under the Clean Air Act: A Menu of Options, July 1996).

In 2002 alone, chronic obstructive pulmonary disease cost the U.S. more than $32 million, a sum not including costs attributable to asthma (American Lung Assoc., Trends in Chronic Bronchitis and Emphysema: Morbidity and Mortality, Epidemiology and Statistics Unit, Research and Scientific Affairs, March 2003). In Arizona, deaths attributable to asthma have equaled or exceeded national rates from 1991-1998. In 1998, some 316,200 Arizonans suffered breathing discomfort or asthma related stress (Arizona Department of Health Services, Asthma Control Program, Office of Nutrition and Chronic Disease Prevention Services, October, 2002).

ADEQ expects that a reduction in PM potentially will create commensurate cost-saving benefits to the general public by contributing towards reducing these emissions-related health problems. Maricopa County's Rule 325 will help improve the general quality of life for citizens of Arizona, particularly those residing near sources that have reduced PM emissions and other air pollutants associated with the manufacturing processes.

Because the installation of air pollution control devices also will reduce other air pollutants, additional health effects may accrue to the public and kiln employees due to reduced exposure levels. It has been demonstrated that exposure to HAPs (mainly HF, HCL, and associated HAP metals) causes adverse chronic and acute health effects. Chronic health disorders include irritation to lung, skin and mucus membranes, certain effects on central nervous system, and damage to kidneys. Acute health effects include lung irritation and congestion, alimentary effects (e.g., nausea and vomiting), and effects on kidney and central nervous system (68 FR 26692-26694, May 16, 2003).

Table 6 -1

Adverse-Health Effect	Per Case Valuation (1990 dollars)	Per Case Valuation (2003 dollars)
Mortality	$4,800,000	$7,122,600
Chronic bronchitis	$260,000	$385,800
Hospital admissions for respiratory conditions	$6,900	$10,240
Hospital admissions for cardiovascular conditions	$9,500	$14,100
Emergency room visits for asthma	$194	$288
Acute Bronchitis	$45	$67
Asthma attack	$32	$48
Moderate or worse asthma day	$32	$48
Adverse-Health Effect	Per Case Valuation (1990 dollars)	Per Case Valuation (2003 dollars)
Acute respiratory symptom	$18	$27
Upper respiratory symptom	$19	$28
Lower respiratory symptom	$12	$18
Shortness of breath, chest tightness, or wheeze	$5	$7
Work loss day	$83	$123
Mild restricted activity day	$38	$56

Health benefits can be expressed as avoided cases of PM related-health effects and assigned a dollar value. EPA used an average estimate of value for each adverse-health effect of criteria pollutants. Table 6-1 contains valuation estimates from the literature reported in dollars per case of chronic bronchitis avoided air. An individual's health status and age prior to exposure impacts his/her susceptibility. At risk persons include those who have suffered a stroke or have cardiovascular disease. Some age cohorts are more susceptible to air pollution than others i.e. children and the elderly.

Mortality in Table 6 actually refers to statistical deaths, or inferred deaths due to premature mortality. The values have been adjusted for inflation. According to the Consumer Price Index for all urban consumers (U.S. Department of Labor, Bureau of Labor Statistics), the purchasing power of the dollar has declined about 48 percent between 1990 and 2003.

A small decline in the risk for premature death will have a certain monetary value for individuals, and as such, they will be willing to pay a certain amount to avoid premature death. For instance, if PM emissions are reduced so that the mortality risk on the exposed population is decreased by one in one-hundred thousand, then among 100,000 persons, one less person will be expected to die prematurely. If the average willingness-to-pay (WTP) per person for such a risk reduction were $75.00, the implied value of the statistical premature death avoided would be 7.5 million.

Potential PM Control Costs Offset by Potential PM Control Benefits: An Illustrative Example

A reduction in PM, as well as associated HAPs, from a tunnel kiln operating in Maricopa County, theoretically, can contribute to avoided health incidents by the general public, and employees that would be exposed during the course of their employment as well. The problem is that it is not possible to calculate the share of adverse-health effects that would be avoided as a direct result of a brick producer reducing PM, and associated air pollutants.

One may conclude that a reduction in PM from a brick kiln would contribute an unknown proportion of overall improvements in the general health of a population. It is likely that a reduction of 20 tons per year of PM would generate some degree of health benefits in Maricopa County. The health benefits, for example, could be as simple as reduced asthma attacks or hospital admissions; reduced emergency room visits and lost work days; or fewer restricted activity days. Health benefits also could include avoided or reduced respiratory symptoms and chronic bronchitis, and reduced premature mortality. The reduction of a single premature death could be worth $4.8 million to $7.1 million dollars in benefits.

If a minimum of one of each of the adverse-health effects shown in Table 6 were to be avoided, the aggregated value of adverse-health effects avoided in 2003 dollars would be $7,533,450. If the impact is such that no effect is contributed toward reduced premature mortality, the minimum value of improved health benefits, as a result of avoided adverse-health effects, would be $410,850. However, a reduction in PM emissions is likely to lead to more than a single health-effect avoided in Table 6-1. Therefore, it is logical to conclude that annual health benefits may be much greater than this minimum value.

A single case of chronic bronchitis avoided ($385,800) generates health benefits that are approximately equal to the dollar amount in the estimated annualized compliance cost for installing and operating a DIFF control device. Furthermore, if a combination of multiple health effects, as listed in Table 6-1, were avoided due to reduced PM emissions, a significant increase in the dollar value of health benefits as a result of Rule 325 would accrue to the general public. For instance, if a single chronic bronchitis condition could be avoided ($385,800), as well as ten cases each of the other adverse-health effects listed in Table 6-1, excluding premature mortality, the aggregated value of avoided-health benefits would be $636,300.

If the entire value of $636,300 in estimated health benefits could be contributed to the 20-ton reduction in PM from the brick producer, this would translate into a per ton health benefit of $31,815. Taking this argument one step further, if the aggregated value of the adverse-health benefits avoided due to a reduction of 20 tons annually of PM, ranged from even a low of $385,800 to a high of $7,533,450, the health benefit would range from $19,290 to $376,672 per ton. Compare the estimated annual abatement cost of $19,500 to remove one ton of PM (from p. 9) to the estimated health benefits gained from reduced PM emissions the range of $19,290 to $376,672 per ton. A logical conclusion of this analysis is that probable benefits will exceed the probable costs of Rule 325.

Considering the annualized cost of $390,000 for DIFF and the potential of passing on part of this cost to brick consumers, the cost effectiveness of removing 20 tons of PM under the two scenarios discussed on p. 9, results in a cost of $4,650 per ton or $9,600 per ton of PM removed. If the actual amount of PM removed annually exceeds 20 tons, the cost effectiveness would be even lower than these estimated values.

10. <u>A description of the changes between the proposed rule, including supplemental rules, and final rule (if applicable):</u>

In Section 401 of the rule, we inserted December 31, 2006 instead of the 36 months from the date of adoption.

11. <u>A summary of the comments made regarding the rule and the agency response to them:</u>

<u>Comment #1</u>: The Most Stringent Measure (MSM) used as the basis for the Particulate Matter (PM) emission standard (0.42 pounds per ton of fired brick) in Rule 325 was taken from 40 CFR 63 Subpart JJJJJ—National Emission Standards for Hazardous Air Pollutants for Brick and Structural Clay Products Manufacturing. This emission standard was intended as a surrogate to control metals that are Hazardous Air Pollutants, not PM. It does not apply to existing small

(<10 tons per hour (tph) of finished product) tunnel kilns or existing tunnel kilns that have accepted production limits to stay under 10 tph. Phoenix Brick's pending Title V permit has this limit. The reason EPA uses this limit is that the contribution of HAPs from tunnel kilns operating <10 tph is not considered to be significant.

Response #1: The County recognizes that 40 CFR 63 Subpart JJJJJ applies only to large existing tunnel kilns (> 10 tons per hour of fired product) and new and reconstructed tunnel kilns regardless of capacity. In order to satisfy Most Stringent Measures (MSM) however, the Arizona Department of Environmental Quality (ADEQ) is required to benchmark all rules that may be applicable to a similar source category. In this case ADEQ identified 40 CFR 63 Subpart JJJJ as a rule that is applicable to similar source categories and thus considered it for inclusion in the proposed State Implementation Plan (SIP). Since the source category in question is under the jurisdiction of Maricopa County, then the County is tasked with implementing the rule.

Comment #2: The Arizona Department of Environmental Quality's Salt River PM-10 State Implementation Plan did not consider the significance of the source contribution in establishing the requirement for MSM for Brick and Structural Clay Products. This Rule written as a requirement from the SIP is an arbitrary application of a stringent rule on a source that has not been proven to be a significant source of PM_{10}. There is no site specific PM monitoring data that proves that this MSM for Phoenix Brick is merited. There is no physical proof that this application of MSM to brick manufacturing will provide any significant reduction in PM_{10} emissions.

Response #2: ADEQ did not make determinations upon whether or not the emissions from a single source were considered to be significant or not. According to the modeling analysis presented in the "Proposed Revised PM_{10} State Implementation Plan for the Salt River Area Technical Support Document (Proposed TSD)," a series of emissions sources were identified as being significant contributors to the overall nonattainment of the study area. While every facility, when considered independently of the sources surrounding it, should be capable of demonstrating compliance with state and county air quality standards, those sources, when considered collectively, contribute to the overall nonattainment of the study area. ADEQ has made the demonstration in the proposed TSD that when all of the proposed control measures and work practice standards are applied collectively, the ambient concentrations of PM_{10} in the study area will demonstrate compliance with the National Ambient Air Quality Standards for PM_{10} by 2006.

Comment #3: ADEQ's Salt River PM-10 State Implementation Plan states that a baghouse could be used to meet the PM emission standard. The AP-42 PM Emission factor (AP-42 Chapter 11.3, Tables 11.3-1 and 11.3-2, 10/1997) for Gas-fired Tunnel Kilns is derived by the addition of filterable PM (0.37 pounds/ton of fired product) plus Condensible Inorganic PM (0.48 pounds/ton) plus Condensible Organic PM (0.11 pounds/ton) for a total PM emission factor of 0.96 pounds/ton. From this emission factor only 0.37 pounds/ton of PM emissions are controllable with a baghouse or fabric filter. The remaining PM emissions (0.59 pounds/ton) are condensible. The proposed emission limitation cannot be achieved with a baghouse or fabric filter.

Response #3: Section 302.1 places a limitation on existing tunnel kilns at brick or structural product manufacturing facilities of 0.42 lbs of particulate matter (PM) per ton of fired product from a tunnel kiln with a capacity of $\geq$ 1.0 tons per hour throughput. This standard, which is based on the Maximum Achievable Control Technology (MACT) standard for PM, is based on filterable PM and not condensibles. The EPA Reference Method 5, "Determination of Particulate Emissions from Stationary Sources," is incorporated by reference into the rulemaking. The applicable part is the front-half analysis of Method 5.

Significant control of condensible PM is not expected from the installation of a fabric filter. A decrease in temperature across a fabric filter potentially could cause some of the condensible PM to condense and be removed from the exhaust by the fabric filter. However, if the exhaust is cooled too much, the acid gases could condense and damage the fabric filter. Therefore, condensibles may not be reduced following the installation of a fabric filter. In the absence of test data from Phoenix Brick Yard, the current amount of uncontrolled filterable and condensible PM emissions is unknown. In fact, it is possible that condensible PM emissions from Phoenix Brick Yard may not represent a significant proportion of the facility's total PM emissions. A variety of factors affect emissions: raw materials (composition and moisture), kiln fuel, kiln operating parameters, and plant design. Therefore, actual condensibles for a specific facility could be less than the emissions factors in the AP-42.

Based on EPA test data there is a range of condensible values from one facility to another. For example, one facility had much higher condensibles (inorganic and organic PM) than the other six facilities used in the calculations. Excluding this one facility, average condensible inorganic PM emission factor was 0.105 lb/ton, and condensible organic PM emission factor was 0.031 lb/ton. If median emission factors are used, which may better represent PM emissions at brick kilns, the values from these same test facilities would be 0.13 lb/ton for condensible inorganic PM and 0.048 lb/ton for condensible organic PM. Of the available EPA test data for PM emissions, total uncontrolled PM emissions from tunnel kilns at 19 facilities ranged from 0.0350 lb/ton to 0.976 lb/ton with an average of 0.492 lb/ton.

Dry lime scrubbers with fabric filters (DLS/FF) and dry injection fabric filters (DIFF) are capable of achieving 99 percent control efficiency for filterable PM. Dry limestone absorbers (DLA), however, may achieve up to 50 percent control efficiency for filterable PM.
As a result, the PM emission standard should be achievable with the available control technology.

Comment #4: ADEQ in the "Economic Impact Analysis or Particulate Matter Emission for Brick and Structural Clay Product Manufacturing" recommends the application of abatement equipment typically applied to treat acid gases, not PM. In fact the use of a Dry Injection Fabric Filter (DIFF) will increase the amount of PM producing materials used at the facility (dry limestone in raw and waste products). The other commonly used acid gas treatment method, Dry Limestone Absorber (DLA), is not an effective method for PM emissions. Neither abatement methods are practical or effective methods of PM emission control.

Response #4: While the control technologies referenced in "Economic Impact Analysis on Particulate Matter Emissions for brick and Structural Clay Products Manufacturing Proposed Rule 325" (DLS/FF and DIFF), are used to treat acid gasses, they also remove filterable PM at 99 percent efficiency. Although a DIFF will increase the amount of PM producing materials used at a facility, it will not increase a facility's PM emissions. Therefore, we disagree with the statement that the DIFF is an impractical or ineffective technology for PM emission control. We agree that a dry limestone absorber (DLA) is not an effective technology for controlling PM.

Comment #5: Nonetheless, Phoenix Brick Yard obtained a budgetary quote for a high temperature baghouse from Griffin Environmental, Syracuse, New York. The exhaust gases from a tunnel kiln approach 500 degrees F and have a low pH. These conditions require pretreatment prior to the baghouse. The budgetary quote includes a baghouse, spray cooler, ID fan, injector system, mixing venturi, absorbent chemical supply system, duct work, instrumentation (PLC based), exhaust stack and structural supports for a budgetary cost of $2,000,000, not including installation. Chemicals are used to neutralize the exhaust gas prior to the baghouse, essentially providing a system comparable to a Dry Injection Fabric Filter (DIFF). Estimated annual operating costs for a DIFF are $180,000 to $360,000, not including maintenance or monitoring costs. The cost of this emission control for 5 years of operation (using the capital and an average annual operating cost, with 0.37 pounds per ton of PM removed and 9.9 tons per hour of material processed in the kiln) would be $41,875 per ton of PM removed. This is an unreasonable control cost.

<u>Response #5:</u> Although a cost of $2 million, excluding installation costs, is quoted for a baghouse, EPA estimated capital costs (in 2000 dollars for tunnel kilns < 10 tons/hr throughput) of about $1.2 million for a DLS/FF and $940,000 for a DIFF. Annualized, these costs would be $450,000 and $390,000, respectively. In these cases, annualized costs include the following: labor (operating, supervisory, maintenance, and replacement of components), materials, electricity, lime, compressed air, replacement bags, waste disposal, overhead, administrative charges, property taxes, insurance, and capital recovery calculated for 10 years @ 7% interest.

Based on this estimate for Phoenix Brick Yard, the cost per ton of PM removed would be $41,875, which is claimed to be an unreasonable control cost. However, this cost represents the cost over only five years of operation as opposed to the 10-year time period calculated for the EPA costs presented in Table 3 of the "Economic Impact Analysis on Particulate Matter Emissions for Brick and Structural Clay Products Manufacturing Proposed Rule 325." In comparison, the cost per ton of PM removed from EPA data is $21,100 for DLS/FF and $18,300 for DIFF, as shown in Table 5 of the above-referenced analysis. These calculations were based on removing 99 percent of filterable PM emissions of 0.492 lb/ton.

According to EPA's model data, the cost to install a DIFF for a medium-sized tunnel kiln (<10 ton/hr throughput) is $940,000. The estimated annualized cost (O&M and capital recovery) is $390,000 (from Table 3). Of the total amount of annualized cost, $132,630 represents the amount of capital recovery while the remaining $257,370 is allocated to O&M costs.

If the brick producer is able to pass on about two-thirds of the increase in compliance costs to brick consumers by increasing the price of a brick by $0.015, it would generate additional sales revenues of $297,000.

This example illustrates that by increasing the price of bricks by 1.5 cents, whether it be in the retail or wholesale price, additional sales revenues could be generated. The remaining compliance cost of $93,000 would be borne by the brick producer. This cost would represent the "effective" cost of controlling filterable PM.

In the event, that marketed conditions were such that the brick producer could only increase the price per brick by only 1.0 cent (2.9% cost increase), the additional sales revenues would generate $198,000. In this alternative example, this would mean $192,000 would have to be borne by the brick producer. This translates into passing on about one-half of the increase in compliance costs to the brick consumer, as opposed to two-thirds of the costs.

In each of these cases, the annualized costs of installing PM technologies potentially would be reduced by the additional sales revenues generated. Thus, either $93,000 or $192,000 would represent the annual cost of installing the PM control technology, after part of the increased compliance costs were passed on to the buyers. In these cases, the cost per ton of PM removed would be $4,366 or $9,014, which is a very reasonable control cost. If annualized costs are greater than expected, these costs would increase, but conceivably they would remain significantly below an $18,000 per ton of PM removed.

Not only should the cost per ton on PM removed be considered, but potential improvements in air quality. Improvements in air quality will generate cost-saving benefits by persons avoiding adverse-health effects, such as emergency room visits, hospital admissions, acute pediatric bronchitis, chronic adult bronchitis, acute respiratory symptom days, and even premature death. Potential benefits arising from a reduction PM and other pollutants emitted into the atmosphere can be inferred from data associated with the reduction of any airborne PM.

Quantified adverse-health effects include the following: mortality, bronchitis (chronic and acute), new asthma cases, hospital admissions (respiratory and cardiovascular), emergency room visits for asthma, lower and upper respiratory illness, shortness of breath, respiratory symptoms, minor restricted activity days, days of work loss, moderate or worse asthma status of asthmatics. Unquantifiable adverse-health effects include: neonatal mortality, changes in pulmonary function, chronic respiratory diseases (other than chronic bronchitis), morphological changes, altered host defense mechanisms, cancer, and non-asthma respiratory emergency room visits.

Epidemiological evidence shows that particulates have negative health impacts in a variety of ways, including: increased mortality and morbidity; more frequent hospital admissions, emergency room and clinician visits; increased need and demand for medication; and lost time from work and school. There is also increasing evidence that ambient air pollution can precipitate acute cardiac episodes, such as angina pectoris, cardiac arrhythmia, and myocardial infraction, although the majority of PM-related deaths are attributed to cardiovascular disease.

Comment #6: In addition to considerable capital and operating costs, retrofitting abatement equipment on older tunnel kilns creates significant problems. The addition of emission control impacts the kiln airflow, which affects the brick color and changes the recipes for brick manufactured in a tunnel kiln. Brick manufacturers may not be able to produce brick that matches existing product lines. Retrofit of emission control equipment will cause a significant amount of kiln downtime and permanent reductions in production capacities with loss of profit.

Response #6: We realize that the application of emissions control to any process may require facilities to re-engineer their processes in order to optimize the operating efficiency of the plant, while reducing emissions. Because reducing both PM_{10} and hydrogen fluoride emissions from this facility is expected to result in positive effects on public health, ADEQ had determined that an investment in additional pollution controls is appropriate.

Comment #7: Phoenix Brick Yard operates the sole brick manufacturing company in the State of Arizona. The facility has been manufacturing brick in this location since 1935. The facility has a total of 92 employees. The economic burden of installing and operating the equipment discussed in this letter will force Phoenix Brick to discontinue operation.

Response #7: According to EPA's projection, the annual social costs of the final NESHAP rule will be $23.3 million. Consumers of bricks are expected to pay 63% of these costs, while brick producers are expected to pay 37% of the total costs (68 FR 26711, May 16, 2003). Although the actual proportion of compliance costs that producers will be able to pass on to brick consumers is unknown, it is likely that it will fall within the range of one-half to three-fourths. As a result, numerous brick kiln operations in the U.S. will face compliance-cost decisions, and as such, any single brick kiln located in Maricopa County would not be in isolation relative to other facilities in the nation that must make compliance-cost decisions about installing air pollution control equipment, as well as decisions about passing on increased compliance costs to consumers. Annualized costs for more than 100 existing large tunnel kilns in the nation are expected to be $24 million. New sources are expected to spend $1.14 million in annualized costs in the first year following promulgation of the rule. Costs include capital investments on control and monitoring equipment, O&M, emission testing, and recordkeeping and reporting (68 FR 26711, May 16, 2003).

Economic impacts on the brick producers and the market in general have been projected by EPA. Compliance costs for the NESHAP rule are expected to increase the price of bricks and reduce output and consumption. As a result, consumers of brick will buy fewer bricks and pay slightly higher prices. The law of demand states that as the price of a good rises, the quantity demanded will fall.

On the production side, brick manufacturers will reduce output and pass on about two-thirds of the increased compliance costs to brick consumers, according to EPA. The brick producers are expected to bear the remaining one-third of the compliance. The reduction in domestic brick production and higher prices are expected to result in a 10 percent decrease in operating profits. However, the majority of the brick producers (71%) in the nation are expected to experience a profit increase, compared to 21 percent of the brick producers expected to generate a loss in profits (68 FR 26711, May 16, 2003).

Although the economic impact of Rule 325 to the brick producer in Maricopa County is unknown, a likely scenario has been developed to illustrate what could be a possibility. According to EPA's model data, the cost to install a DIFF for a medium-sized tunnel kiln is \$940,000. The estimated annualized cost (O&M and capital recovery) is \$390,000 (refer to Table 3). Of the total amount of annualized cost, \$132,630 represents the amount of capital recovery while the remaining \$257,370 is allocated to O&M costs.

If the brick producer is able to pass on about two-thirds of the increase in compliance costs to brick consumers by increasing the price of a brick by \$0.015, it would generate additional sales revenues of \$297,000. This annualized cost translates into a cost effectiveness of \$19,500 per ton if 20 tons of PM were reduced per year.

This example illustrates that by increasing the price of bricks by 1.5 cents, whether it be in the retail or wholesale price, additional sales revenues can be generated. The remaining compliance cost of \$93,000 would be borne by the brick producer. This cost could impact operating profits. An option of the producer would be to increase production throughput to offset any reductions in operating profits, but still remain under the ten ton per hour limit.

If the brick producer decides to increase the price per brick by only 1.0 cent (2.9% cost increase), the additional sales revenues would generate \$198,000. In this second case, this would leave \$192,000 to be borne by the producer. This translates into passing on about one-half of the increase in compliance costs to the brick consumer. Again, the producer could increase production, provided the market for bricks was sufficiently strong, to compensate for increased compliance and production costs. Management decisions also could be made to reduce costs by making the production activities more efficient thereby potentially increasing operating profits.

Comment #8: EPA Region IX commented that the compliance date in Section 401 must be changed from 36 months to no later than Dec. 31, 2006 for the proposed rule to be approved as BACM/MSM for brick manufacturing. The December 31, 2006 date matches the attainment date in the Salt River SIP.

Response #8: The County is changing the compliance date to December 31, 2006. The approximately 21 month period more closely matches EPA policy on compliance periods. It provides for a complete budget cycle to program the necessary capital purchases and time to install and bring the new controls on line. Furthermore, the County and ADEQ informed the brick manufacturers in the Spring of 2004 that industrial emissions were a significant contributor to violations of the National Ambient Air Quality Standards (NAAQS) in the Salt River. This identification triggered the Clean Air Act requirement for BACM/MSM. The industry has been aware of those requirements since that time.

12. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

Not applicable.

13. Incorporations by reference and their location in the rules:

Incorporations by reference and their location in the rules:	Location
EPA Reference Method 9 (Visual Determination of the Opacity of Emissions from Stationary Sources)	Section 503.1
EPA Reference Method 5 (Determination of Particulate Emissions from Stationary Sources)	Section 503.2

Incorporations by reference updated to 7/1/03:	Location
40 CFR Part 60 Appendix A	Section 503

14, Was this rule previously made as an emergency rule?

No

15. The full text of the rule follows:

REGULATION III - CONTROL OF AIR CONTAMINANTS

RULE 325

BRICK AND STRUCTURAL CLAY PRODUCTS (BSCP) MANUFACTURING

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RULE 325

BRICK AND STRUCTURAL CLAY PRODUCTS (BSCP) MANUFACTURING

SECTION 100 – GENERAL

101 PURPOSE: To limit particulate matter emissions from the use of tunnel kilns for curing in the brick and structural clay product (BSCP) manufacturing processes.

102 APPLICABILITY: This rule applies to any existing, new or reconstructed tunnel kiln, used in the commercial and industrial brick and structural clay product manufacturing processes. Compliance with the provisions of this rule shall not relieve any person subject to the requirements of this rule from complying with any other federally enforceable New Sources Performance Standards (NSPS). In such cases, the most stringent standard shall apply.

103 EXEMPTIONS: Existing, new or reconstructed tunnel kilns that are used exclusively for research and development and are not used to manufacture products for commercial sale are not subject to this rule.

SECTION 200 – DEFINITIONS: See Rule 100 (General Provisions And Definitions) of these rules for definitions of terms that are used but not specifically defined in this rule. For the purpose of this rule, the following definitions shall apply:

201 BRICK AND STRUCTURAL CLAY PRODUCTS (BSCP) MANUFACTURING FACILITY- A site that manufactures brick including, but not limited to: face brick, structural brick and brick pavers; claypipe; roof tile; extruded floor and wall tile; and/or other extruded, dimensional, clay products. Brick products manufacturing facilities typically process raw clay and shale, form the processed materials into bricks or shapes, and dry and fire the bricks or shapes.

202 CONTINUOUS KILN – A heated chamber that heats dense loads uniformly and efficiently, and can be used without interruption for high volume production. Continuous kilns are kilns that perform well in the consistent high production of wares. Continuous kilns include tunnel kilns, shuttle kilns, fixed-hearth kilns, bee hive kilns, roller kilns, sled kilns, decorating kilns, and pusher slab kilns. Most continuous kilns are tunnel kilns.

203 **EXISTING KILN -** A kiln that is in operation before the date of adoption of this rule.

204 **KILN FEED** – All materials except fuel entering the tunnel kiln, including raw feed and recycle dust, measured on a dry basis.

205 **PERIODIC KILN** – A kiln that operates on an intermittent basis to heat wares, holding them at a uniform peak temperature and cool the wares. Periodic kilns are best for inconsistent or low-volume production.

206 **RESEARCH AND DEVELOPMENT TUNNEL KILN-** Any tunnel kiln whose purpose is to conduct research and development for new processes and products and is not engaged in the manufacture of commercial products for sale.

207 **TUNNEL KILN –** Any continuous kiln that is used to fire brick and structural clay products. Tunnel kilns may have two process streams, including a process stream that exhausts directly to the atmosphere or to an Air Pollution Control Device, and a process stream in which the kiln exhaust is ducted to a brick dryer where it is used to dry bricks before the exhaust is emitted to the atmosphere.

SECTION 300 – STANDARDS

301 **OPACITY LIMITATIONS FOR ALL TUNNEL KILNS SUBJECT TO THIS RULE:** No person shall discharge into the ambient air from any single source of emissions any air contaminant, other than uncombined water, in excess of 20 % opacity.

302 **LIMITATIONS FOR EXISTING TUNNEL KILNS AT BRICK OR STRUCTURAL PRODUCT (BSCP) MANUFACTURING FACILITIES:**

302.1 No owner or operator shall emit more than 0.42 lbs. of particulate matter per ton of fired product from a tunnel kiln with a capacity of ≥1 tons per hour throughput.

303 **LIMITATIONS FOR NEW OR RECONSTRUCTED TUNNEL KILNS AT BRICK OR STRUCTURAL PRODUCT (BSCP) MANUFACTURING FACILITIES:**

303.1 No owner or operator shall emit more than 0.42 lbs. of particulate matter per ton of fired product from a tunnel kiln with a capacity of < 10 tons per hour throughput.

303.2 No owner or operator shall emit more than 0.12 lbs. of particulate matter per ton of fired product from a tunnel kiln with a capacity of $\geq$ 10 tons per hour throughput.

SECTION 400 - ADMINISTRATIVE REQUIREMENTS

401 COMPLIANCE SCHEDULE: Any owner or operator of a tunnel kiln subject to this rule shall be in full compliance by December 31, 2006.

SECTION 500 - MONITORING AND RECORDS

501 COMPLIANCE DETERMINATION: Compliance shall be demonstrated through measurement of particulate matter concentration by performance of the test methods listed in Section 503 no later than September 9, 2005.

502 RECORDKEEPING / RECORDS RETENTION: The owner or operator of any kiln subject to this rule shall comply with the following requirements and keep records for a period of 5 years:

502.1 Daily records of kiln feed fired and hours of operation; and

502.2 Monthly records of material delivered to the site for processing in the tunnel kiln and the amount of product produced reported in tons.

503 TEST METHODS: The Environmental Protection Agency (EPA) test methods as they exist in the Code of Federal Regulations (CFR) (July 1, 2003), as listed below, are adopted by reference. These adoptions by reference include no future editions or amendments. Copies of test methods referenced in this section of this rule are available at the Maricopa County Environmental Services Department, 1001 North Central Avenue, Suite 201, Phoenix, Arizona, 85004 -1942.

503.1 EPA Reference Method 9 ("Visual Determination of the Opacity of Emissions from Stationary Sources"), (40 CFR 60, Appendix A).

503.2 EPA Reference Method 5("Determination of Particulate Emissions from Stationary Sources"), (40 CFR 60, Appendix A) and possibly, if requested by the Control Officer, EPA Reference Method 202 ("Determination of Condensable Particulate Emissions from Stationary Sources"), (40 CFR 51, Appendix A).